

and storage of feeds of captive animals. Familiarization about restraining, handling and physical examination of captive animals.

UNIT-5 (POULTRY PRODUCTION MANAGEMENT)

Common breeds of poultry, different classes, Indian chickens and other avian species breeds. Digestive and respiratory system of chicken. Male and female reproductive system—Quality changes in egg during storage. Economic traits of broilers. Economic traits of egg-type chicken and breeders. AI in poultry. Housing and design of a poultry farm. Poultry farm equipment and their classification. Brooding arrangement in broiler farms. Poultry feed ingredients and its quality assessment. Poultry feed preparations. Calculation of different economic indices of broiler farm. Calculation of economic indices of layer farm. Fundamentals in poultry Post-mortem examination for sample collection. Collection and dispatch of samples for PM examination. Management during Summer, Winter and Rainy season. Automization in poultry farms (EC house).

UNIT-6 (INCUBATION AND HATCHERY MANAGEMENT)

Hatchery layout and design. Project report for establishing a broiler farm. Project report for establishing a layer farm. Project report for establishing a breeder farm. Visit to commercial poultry farms or hatchery or feed mill. Visit to farms of other avian species.

UNIT-7 (LABORATORY OR RABBIT OR PET ANIMAL PRODUCTION MANAGEMENT)

Identification of body parts and handling, weighing, sexing and weaning of laboratory animals. Marking for identification of laboratory animals for purpose of their individual recording. Computation, feeding schedule of balanced diet for high breeding efficiency of laboratory animals. Maintenance of breeding records of laboratory animals. Prophylactic measures against common disease of laboratory animals. Hygienic care and control of parasites. Shearing of rabbit. Feeding and Housing requirement and equipments for rabbit. Projects report for establishing of rabbit farm. Handling and restraining of dog, cat and pet bird and equipments for pet animals and birds. Brushing or grooming and bathing of dogs and cats. Nail and tooth care, clipping of hairs for show purpose. Care of pups, kitten and weaning.

UNIT-8 (SWINE OR EQUINE OR CAMEL, YAK AND MITHUN PRODUCTION MANAGEMENT)

Handling, restraining of swine, equines, camel. Identification of pregnant animals, care during pregnancy, isolation and care of farrowing sows and piglets. Preparation of swine, equine for show and judging, Economics of pig. Routine inspection, tooth care and vaccination schedule. Horse riding: walking, trotting, cantering and galloping. Layout plans for sty, stables

ANNUAL EXAMINATION

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
THEORY			
Paper-I	1, 2, 3, 4 and 5	100	20
Paper-II	6,7,8 and 9	100	20
PRACTICAL			
Paper-I	1, 2, 3 and 4	60	20
Paper - II	5,6,7 and 8	60	20

(iv) DEPARTMENT OF VETERINARY MICROBIOLOGY

VETERINARY MICROBIOLOGY

Credit Hours: 3+2

THEORY

UNIT-1 (GENERAL & SYSTEMATIC VETERINARY BACTERIOLOGY)

Introduction and history of Microbiology; Classification and nomenclature of bacteria; Microscopy and Micrometry; Bacterial stains and techniques; Structure and morphology of bacteria; Growth and nutritional requirement of aerobic and anaerobic bacteria; Normal, opportunistic and saprophytic bacterial flora: Types and sources of infection, method of transmission of infection. Pathogenicity, virulence, determinants of virulence, Epizootic and enzootic diseases, bacteremia, septicemia and toxemia, endotoxins, exotoxins, antitoxins, toxoids; Bacterial genetics (Mutation, Transformation, Transduction and Conjugation), plasmids and antibiotic resistance.

Study of the following bacteria in relation to isolation, growth, cultural, morphological, biochemical and antigenic characteristics, epidemiology and pathogenesis, pathogenicity, diagnosis, prevention and control of bacterial diseases caused by following bacteria:

Staphylococcus; Streptococcus; Corynebacterium, Trueperella, Rhodococcus; Listeria and Erysipelothrix; Bacillus; Mycobacterium; Clostridium, Actinomyces, Nocardia, Streptomyces and Dermatophilus; Family Enterobacteriaceae (E.coli, Klebsiella, Salmonella, Yersinia, Proteus); Pseudomonas and Burkholderia; Pasteurella, Mannheimia, Actinobacillus and Haemophilus, Brucella; Vibrio; Campylobacter; Bordetella and Moraxella; Gram negative anaerobes: Bacteriodes, Dichlobacteria and Fusobacterium; Leptospira and other Spirochaetes; Mycoplasma, Coxiella, Neorickettsia, Ehrlichia, Anaplasma, Rickettsia; Chlamydia and Chlamydophila

Emerging, re-emerging and transboundary bacterial pathogens.

UNIT-2 (VETERINARY MYCOLOGY)

Introduction, classification, general properties of fungi; Growth and Reproduction of fungi; Study of following important pathogenic fungi in relation to their isolation, growth, morphological, cultural, biochemical and antigenic characteristics, epidemiology, pathogenesis, diagnosis and control of fungal diseases caused by following genera: *Candida* and *Cryptococcus; Aspergillus; Penicillium; Dermatophytes* and *Malassezia*; Dimorphic fungi, *Rhinosporidium* and *Sporotrichum; Mycetoma* and *Zygomycetes; Mycotic mastitis* and *mycotic abortion; Mycotoxicoses*

UNIT-3 (MICROBIAL BIOTECHNOLOGY)

Basic concepts and scope of Recombinant DNA technology; Gene cloning, Cloning vectors and expression vectors; Transformation and transfection; Southern, Northern and Western blotting; Bioinformatics, Gene banks; Application of molecular and biotechnological techniques: Polymerase chain reaction, Nucleic acid hybridization, DNA library, DNA sequencing and DNA fingerprinting; IPR. Ethics and regulatory issues in Animal Biotechnology.

UNIT-4 (VETERINARY IMMUNOLOGY AND SEROLOGY)

History of Immunology; Lymphoid organs, tissues and Cells: Types of Immunity; Antigens, hapten, epitope, Specificity, T dependent and T independent Antigens, heterophile Antigens, cross reacting Antigens, blood group Antigens, Mitogens and factors affecting immunogenicity; Adjuvants; Antibody: Structure, physiochemical properties and functions of various classes of immunoglobulins, Theories of antibody production; Hybridoma and monoclonal antibodies, Serological reactions. Major histocompatibility complex (MHC) structure, function and gene organization; Structure of BCR and TCR; Antigen processing and presentation; Complement system: activation pathways and biological consequences; Cytokines: general properties, major types and function; Hypersensitivity: classification and mechanism of induction; Autoimmunity; Immunotolerance; Concept of Immunity to Microbes, Vaccines and other biological.

UNIT-5 (GENERAL AND SYSTEMATIC VETERINARY VIROLOGY)

History of Virology; Introduction to viruses; Structure of Viruses; Classification of Viruses; Viral Replication; Genetic and Non-genetic viral interactions; Virus-Cell Interactions; Viral Pathogenesis, Oncogenesis, latency and immunopathology. Studies on General Properties, Antigens, Cultivation, Pathogenesis, Epidemiology, Clinical Signs, Diagnosis, Prevention and Control of following Viruses and Prions Causing Diseases in Livestock and Poultry: *Bimaviridae*: Infectious bursal disease virus; *Reoviridae*: Rotaviruses, Bluetongue virus, African horse sickness virus; *Paramyxoviridae*: Newcastle disease virus, Canine distemper virus, PPR virus; *Rhabdoviridae*: Rabies virus, Ephemeral fever virus, *Bornaviridae*: Borna virus. *Orthomyxoviridae*: Swine, Equine, Avian Influenza Viruses. *Coronaviridae*: Infectious Bronchitis virus, Transmissible gastroenteritis virus; *Arteriviridae*: Equine viral arteritis virus, *Picornaviridae*: FMD virus, Duck viral hepatitis virus; *Caliciviridae*: Feline calici Virus, *Togaviridae*: Equine encephalomyelitis viruses; *Flaviviridae*: Swine fever virus, BVD virus; *Retroviridae*: Visna or maedi virus, Equine infectious anemia virus, Lymphoid leucosis virus, Bovine leukemia virus. *Poxviridae*: Capripoxvirus, Avipoxvirus, Cowpoxvirus; *Asfarviridae*: African Swine Fever Virus; *Herpesviridae*: Bovine herpes viruses, Equine Herpes viruses, Infectious laryngotracheitis virus, Marek's disease virus, Pseudorabies virus, Malignant Catarrhal Fever virus; Duck Plague virus, *Adenoviridae*: Infectious Canine Hepatitis virus, Egg Drop Syndrome virus, Fowl adenovirus, *Papillomaviridae*: Papillomatosis, *Parvoviridae*: Canine parvoviruses, Feline panleucopenia virus; *Circoviridae*: Chicken Anemia Virus: Prions: Scrapie, Bovine Spongiform Encephalopathy; Emerging, re-emerging and transboundary viruses and Viral Infections.

PRACTICAL

UNIT-1 (GENERAL AND SYSTEMATIC VETERINARY BACTERIOLOGY)

Orientation to bacteriology laboratory; Methods of sterilization and disinfection; Preparation of culture media for cultivation of aerobic and anaerobic bacteria; Methods of inoculation, Cultivation of aerobic and anaerobic bacteria; Isolation of bacteria in pure culture; Simple staining, Negative staining, Differential staining procedures of bacteria: Gram's staining, Acid fast staining; Special staining procedures: Capsule and Spore staining; Bacterial motility; Culture sensitivity test; Outlines of collection, transportation and processing of samples for bacterial disease diagnosis.

Characterization of *Staphylococcus*; *Streptococcus*; *E. coli* *Salmonella*; *Klebsiella* and *Proteus*; *Pseudomonas*; *Pasteurella*; *Clostridium*; Isolation and identification of bacteria from clinical cases of Mastitis, Abortions, Enteric, Respiratory and Pyogenic infections.

UNIT-2 (VETERINARY MYCOLOGY)

Outline of collection, transportation and processing of samples for fungal disease diagnosis, Preparation of culture media, Cultivation and slide culture technique of fungi; Cultural characteristics of fungi; Lactophenol cotton blue staining to study morphology of fungi; Culture sensitivity test of fungi; Diagnosis of Aspergillosis and Candidiasis; Demonstration of other important yeast, moulds and Dermatophytes

UNIT-3 (MICROBIAL BIOTECHNOLOGY)

Extraction and quantitation of nucleic acid; Plasmid isolation and plasmid profiling; Agarose gel electrophoresis for studying or diagnosis of nucleic acid of microbes; SDS PAGE electrophoresis for studying or diagnosis of proteins of microbes; Use of Multimedia and audio-visual aids for molecular biology aspects.

UNIT-4 (VETERINARY IMMUNOLOGY AND SEROLOGY)

Inoculations of lab animals, preparation of antigen, Raising of antisera, separation and preservation of serum, Concentration of Immunoglobulins, Agglutination tests: Plate, Tube, Haemagglutination, Precipitation test: Agar gel precipitation Test, Single radial immunodiffusion test, Immuno-electrophoresis, Cell mediated immune response (DTH), Enzyme linked immunosorbent assay (ELISA), Visit and appraisal of Veterinary biological institute.

UNIT-5 (GENERAL AND SYSTEMATIC VETERINARY VIROLOGY)

Orientation to a virology laboratory; Collection, preservation, transport of samples and their processing in virology laboratory; Isolation of viruses in laboratory animals or poultry or embryonated chicken eggs; Preparation of media and reagents for cell culture; Subculture and maintenance of continuous cell lines; Quantitation of cells by viable cell counts in a haemocytometer; Cryopreservation and recovery of cell cultures; Preparation of Primary cell culture (chicken embryo fibroblast or Lamb kidney); Demonstration of cytopathic effect by viruses in cell culture (Important virus isolates available in the department); Demonstration of Titration of virus by TCID₅₀ and plaque assay in cell cultures*; Demonstration of neutralizing antibodies by serum neutralization test in cell cultures* ; Agar gel precipitation test for detection of virus infection*; Titration of Newcastle disease virus by haemagglutination test; Haemagglutination inhibition test for detection of antibodies to Newcastle disease virus; ELISA for detection of viral antigen and antibodies; Molecular techniques for viral disease diagnosis

*Important virus isolates available in the department.

ANNUAL EXAMINATION

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
THEORY			
Paper-I	1,2 and 3	100	20
Paper-II	4 and 5	100	20
PRACTICAL			
Paper-I	1, 2 and 3	60	20
Paper - II	4 and 5	60	20

(v) DEPARTMENT OF VETERINARY PATHOLOGY

VETERINARY PATHOLOGY

Credit Hours: 4+2=6

THEORY

UNIT-1 (GENERAL VETERINARY PATHOLOGY)

Introduction and scope of Veterinary Pathology. Major intrinsic and extrinsic causes of disease. Haemodynamic disorders (hyperaemia, congestion, haemorrhage, oedema, thrombosis, embolism and infarction). Glycogen overload, amyloidosis and fatty changes. Reversible and irreversible cell injury- degenerations, necrosis and its types, apoptosis, differences between post-mortem autolysis and necrosis, gangrene and its types. Major exogenous and endogenous pigments. Metastatic and dystrophic calcification. Photosensitization. Disturbances in growth (Aplasia, hypoplasia, atrophy, hypertrophy, hyperplasia, metaplasia and dysplasia). Inflammation: Definitions, classification, various cell types